NAVAL WAR COLLEGE
Newport, Rhode Island

Preventing Network Centric Overload
(End State Education for the Operational Commander/Staff)

by

John D. Beck
Major, USA

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Electives, Media and the Military.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature: _____

05 February 2001

_____
Faculty Advisor:
Professor D. M. Goodrich

Preventing Battle Command Overload
(End State Education For The Operational Commander/Staff)
Table of Contents

Unclassified

Security Classification This Page

REPORT DOCUMENTATION PAGE

1. Report Security Classification: UNCLASSIFIED	
2. Security Classification Authority:	
3. Declassification/Downgrading Schedule:	
4. Distribution/Availability of Report: DISTRIBUTION STATEMENT A: APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED.	
5. Name of Performing Organization: JOINT MILITARY OPERATIONS DEPARTMENT	
6. Office Symbol: C	7. Address: NAVAL WAR COLLEGE 686 CUSHING ROAD NEWPORT, RI 02841-1207
8. Title (Include Security Classification): Preventing Network Centric Overload - End State Education for the Operational Commander/Staff (U)	
9. Personal Authors: John D. Beck, Major, USA	
10. Type of Report: FINAL	11. Date of Report: 5 February 2001
12. Page Count: 27	Advisor: Prof Goodrich
13. Supplementary Notation: A paper submitted to the Faculty of the NWC in partial satisfaction of the requirements of the JMO Department. The contents of this paper reflect my own personal views and are not necessarily endorsed by the NWC or the Department of the Navy.	
14. Ten key words that relate to your paper: Network-Centric Warfare, Joint Vision 2010, Relevant Common Picture, Command by Influence, Education, Implicit Learning	

15. Abstract:

The future network centric battlefield will create a fog of war that cannot be imagined by today's operational leader. It is imperative that commanders are prepared to operate in a world in which technological capacity doubles at a yearly rate. An end state education system must be devised that prepares our senior leaders to operate a newly formed network centric task force with equipment, organizations and theory of use that most likely did not exist in the very recent past. An end state education system that promotes continual learning and fuels the desire to optimize the efficiency of the network centric organization through education is necessary to maintain dominance on the future battlefield. End state educational challenges exist and simply pushing information will further overload the operational commander. However, the right mix of philosophy, doctrine, educators and personal/organizational training tools will ensure that the operational leader is best prepared to battle command in the 21st century.

16. Distribution / Availability of Abstract:	Unclassified X	Same As Rpt	DTIC Users
17. Abstract Security Classification: UNCLASSIFIED			
18. Name of Responsible Individual: CHAIRMAN, JOINT MILITARY OPERATIONS DEPARTMENT			
19. Telephone: 841-6461		20. Office Symbol: C	

Security Classification of This Page Unclassified

Abstract

Preventing Battle Command Overload
(End State Education for the Operational Commander/Staff)

The future network centric battlefield will create a fog of war that cannot be imagined by today's operational leader. It is imperative that commanders are prepared to operate in a world in which technological capacity doubles at a yearly rate. An end state education system must be devised that prepares our senior leaders to operate a newly formed network centric task force with equipment, organizations and theory of use that most likely did not exist in the very recent past. An end state education system that promotes continual learning and fuels the desire to optimize the efficiency of the network centric organization through education is necessary to maintain dominance on the future battlefield. End state educational challenges exist and simply pushing information will further overload the operational commander. However, the right mix of philosophy, doctrine, educators and personal/organizational training tools will ensure that the operational leader is best prepared to battle command in the 21st century.

DRAFT RESPONSE SUGGESTIONS

PART I

1. **D.E.S.** - Democratic Government friendly to U.S./Internal Stability
   - Free-Market Economy/Full access
   - Regional Partner (OAS)/Major player in Caribbean Basin
   - International Partner (U.S./UN)/Aligned with western bloc

2. **RISK ASSESSMENT** - Increased Refugee Flow
   - Long-Term Commitment (i.e., forces, funding, elections)
   - Collateral Damage (i.e., infrastructure, civilian casualties)
   - U.S. casualties
   - Acceptable Force Ratios
   - Legitimacy (Cuban acceptance of U.S.- led efforts)
   - Determination of rightful government for cooperation/transition
   - U.S. unilateral action without UNSCR/OAS mandate
   - U.S. determination of vital, important, or other interest
   - Assumptions?
   - Failure? (Contingency Plans)

PART II

1. **CINC's MISSION STATEMENT**

   WHO - USSOUTHCOM/(COMBINED) JOINT TASK FORCE CUBA (CJTFC)

   WHAT - Employ FDOs (Diplomatic - UNSCR, OAS Mandate; Economic - Embargo; Military - Show of Force, Maritime Intercept Operations (MIO); Informational - PSYOP, Public Affairs); reinforce GITMO
   - Conduct military and /or peace operations (methods of combat force employment)

   WHERE - Cuba and its territorial waters/periphery of the island (Define JOA/AOR)

   WHEN - On order; as directed

   WHY - In support of the NCA/UNSCR/OAS

2. **COMMANDER's INTENT**

   PURPOSE - To restore law and order
   - To preserve LOCs and FON/maneuver
   - To prevent human rights violations
   - To reestablish the economy/infrastructure
   - To transition to a democratic form of government

   METHOD - Through use of FDOs (IO Campaign, blockade to isolate, show of force to demonstrate resolve)
   - Through Operational Fires to set the conditions, i.e., Suppression of Enemy Air Defenses (SEAD)
   - Through permissive reinforcement of GITMO (maneuver, logistics)
   - Through split-based operations (C2, maneuver, fires, logistics) (CONUS vs Cuba)

- Through demining efforts
- Through coalition building
- Through nonpermissive peacemaking efforts (expand beyond GITMO)
- Through the seizure of ports and airfields
- Through the destruction of C2 and logistics sites; isolation of reserves
- Through securing key/critical nodes (military, political, NucBioChem)
- Through amphibious assault and/or airland operations
- Through Interagency Cooperation (governmental and nongovernmental organizations/PVOs regionally and internationally)
- Through post-hostilities peacekeeping efforts
- Through nation building activities (TEP for post-hostilities)

END STATE
- Reduce/eliminate the flow of refugees (repatriation?)
- Eliminate weapons trafficking
- Reduce drug flow
- Reduce the spread of disease
- Enhance OAS posture in the region
- Invigorate agrarian economy
- Enhance industrial base
- Restore public services/infrastructure
- Establish Host Nation (HN) police/security force
- Establish HN government
- Restore regional stability

3. CRITICAL SHORTFALLS
- Rapid Reaction Type Forces, i.e., 82d Abn Div
- Strategic Intelligence, i.e., political divisions, military leadership, regional players/political support
- SOF (ISR, HUMINT), i.e., SF, Rangers
- Land/Ground Component Commander Forces
- Reserve activation times, i.e., CA, PSYOPS, MP
- Air Force Assets, i.e., land based air to air, air to ground
- Mobility Assets (movement, demining)
- Transport (inter and intra theater lift; rotary wing a/c)
- Sustainment (A/DACG, port opening pkg, Materiel Handling Equipment/MHE, HN support)
- CVBG

4. COMMAND STRUCTURE/RELATIONSHIPS
- JTFC/CJTFC (Combined preferred)
- LCC/GCC - USARSO
- NCC/MCC - COM2DFLT

5. SUPPLEMENTAL ROE -

A. COA involving Coalition MIO, NEO & Refugees

- Entry into land territory, national airspace, and waters of Cuba is forbidden, except within and over NAVBASE GITMO

- Defense of non-U.S. coalition units authorized
- Use of riot control agents (RCA) to control civilians is authorized
- Infiltrating civilians into NAVBASE GITMO are to be detained
- Infiltrating military forces are to be disarmed and detained using appropriate force
- Use of minimum force necessary to carry out MIO and and NEO is permitted
- Warn vessels inbound or outbound from Cuba of embargo
- Seize and divert to Miami inbound vessels failing to heed warning and carrying arms and munitions. Seize and divert to NAVBASE GITMO outbound vessels failing to heed warnings and carrying refugees. Detain crew and passengers of diverted vessels.

B. COA involving Strikes of Peace Enforcement

- Entry into land territory, national airspace, and waters of Cuba is permitted
- IADS and C2 of Western and Central Armies declared hostile and are to be attacked
- Western and Central Army units entering Eastern Army sector declared hostile and are to be attacked
- Use of all types of conventional weapons is permitted as required in order to neutralize designated units
- Damage to private property will be held to a minimum consistent with tactical requirements

6. RECOMMENDED COURSE OF ACTION

Phase I - Pre-Hostilities - FDOs, force buildup, establish BOOs/LOOs/LOCs
Phase II - Reinforcement Entry - Peacemaking Operations
Phase III - Expanded Entry - Peacekeeping Operations
Phase IV - Post-Conflict Hostilities - Civil-Military Operations Center (CMOC)
- UN Provincial Administrator
- Vet/Train/Equip HN Police/Security Force

7. CONOPS -

Operational Factors - space, time, forces (AOR/JOA)
Operational Functions - C2, fires, protection, intelligence, support, maneuver/movement
Operational Scheme/Design
Operational Phasing
Operational Sequencing
Operational Synchronization
Information Operations Campaign (PSYOP)
Interdict Arms Flow (USCG/USN)
Control/Assist Refugees - JTF-Civil Support (Miami)
- UNHCR (Cuba)
Reinforce Guantanamo/Operational Reserve/Operational Protection
Peacemaking Operations/Operational Reserve/Operational Reach/Operational Protection
Transition to Peacekeeping Operations/Operational Reserve/Operational Reach/Operational Protection
Force modification/reinforcement/unit & asset rotation policy
Infrastructure/Nation Building, i.e., MTTs, MEDRETs, HA (TEP; Reserve Rotations)
Transition to Civilian Authorities
Redeployment

8. CONDITIONS FOR TRANSITION FROM PHASE III TO PHASE IV

Political, military, and economic stability
Interim Government
Functional legal system (law enforcement, courts)
Presidential Partial Reserve Call-up
Event/Time-based MOEs (types/amount of crime, economic indicators, registration of voters, amount of refugees, types/amount of disease)

PART III

Feasible - are the forces and assets available adequate to accomplish the mission, i.e., means?
Acceptable - are the estimated costs worth the estimated results, i.e., risk?
Adequate - does the proposed operation accomplish the mission of and by itself, i.e., ways?

1. MILITARY OPTION RECOMMENDATION AND RATIONALE

Phased response necessary due to force limitations and necessity for ongoing political negotiations
Initial response is interim due to force limitations
MIO and refugee control critical for initial operational success
Forced entry without additional allocated forces is very high risk
International mandate and participation crucial for political feasibility
Ultimate solution requires political, military, economic, psycho-social and informational factors to be incorporated for an acceptable and lasting resolution of the crisis

Preventing Network Centric Overload

End State Education for the Operational Commander/Staff

Introduction -

Carl Von Clausewitz accurately assessed the potential for various factors to produce the fog and friction in war[i]. With the advent of Network Centric Warfare, many believe that the fog may be lifting. However, the cloud may become even thicker and permeate the battle space for longer periods of time as the complexity of decision-making while operating with network centric organizations, platforms, and sensors increases. Implementation of Joint Vision 2010, coupled with the emergence of Network Centric Warfare theory and technology, has the potential to create Network Centric Overload. Even the greatest warrior will experience difficulties operating in an environment where the techniques of decision-making learned over a 25-35 year career may no longer be valid and could continue to change with every new technological leap.

> "It is time to admit that the theories and ideals of decision making we have held over the past 25 years are inadequate and misleading, having produced unused decision aids, ineffective decision training programs and inappropriate doctrine...DoD often follows the lead of behavioral scientists, so it is important to alert DoD policy makers to new developments in models of decision making."[ii]

The operational commander cannot be isolated from real time change in technology and processes that would give both he and the enemy potential advantages in the Network Centric operational environment. Therefore, we cannot miss the opportunity to educate the operational level commander and staff as new processes emerge. An end

state education system must be developed that espouses a new philosophy that looks forward to change in the 21st century. The system must include professional educators who are eager and possess the ability to teach our senior leaders about the network centric capabilities available to them. Educators, utilizing the proper tools and relevant doctrine, will be able to link the operational commander and staff with new theories of decision-making, technology and lessons learned that can better enable the commander and his staff to maintain dominance in the rapidly evolving Network Centric Environment.

Background -

With the advent of modern technology and the need to revolutionize thinking about how to command and control organizations with complex systems, the significance of the often-quoted Sun Zu phrase "know yourself and know your enemy"[iii] is perhaps even more applicable. Senior operational leaders do not belong to the Music Television (MTV) generation that grew up never knowing a world without computers or global network connectivity. Present leaders are averse to changes in processes and systems that are evolving by the day and not by the decade[iv]. These leaders must become part of the new generation and lead with a mindset that accepts change in network centric capabilities as the accepted and desired norm. It may take an entire generation of officers to leave the military until operational level leaders will emerge who can fully grasp, based on life experiences, the unique leadership challenges that they face.

The training, doctrine and procedures currently developed for today's systems and organizations may be antiquated the day those processes are implemented for the

combatant in the field. Current education processes are driven by technology and systems that doubled in capability every 10 years. Today's technology has the potential to double every 12 months[v]. So, as time compresses with technological change and the need for speed of decision-making and action in the operational environment, there is a need to educate commanders on how to deal with technologies that effect decision-making processes that range from top down to flat and which may eventually appear like a randomly connected web[vi]. As the decision making process becomes flat, or otherwise, it is necessary to understand how the effects of everyone acting on the commander's intent will be felt across the organization, not just up and down.

To further complicate matters, operational leaders and staffs must focus on the present and future operations as the line blurs between interconnected players and simultaneous events. There is no time to start learning after operations commence. Every action will be quick and decisive and the outcome of a poor decision may be unrecoverable.

NCW End State Education System

Development of a network centric end-state education system is necessary to combine what has been learned over an entire career through the professional military education system and then focus the operational level commander and his primary staff on the mission assigned with the organizational structure, technology, and decision-making theory on hand to maximize the potential capabilities of the organization. A real time link must exist between the technology, organizations, and procedures that have

been allocated for the specific mission and a group of educators ready to help prepare the leader for changes in network centric capabilities.

However, it is also understood that an education/training system has unique challenges to avoid overloading the commander with information, in the crisis action planning cycle, which would further the level of confusion and fog prevalent in war. "The challenge is to provide such knowledge in a manner that is useful to the war fighter (in terms of quantity, timeliness, and format). Simply "pushing" information to the user is likely to result in overload and confusion." [vii]

Although end state education would be only a small part a proposed mission capability package concept[viii], it would be tailored for the specific operation to ensure simplicity, prevent redundancy and reduce the complexities associated with Network centric warfare decision making for a specific Joint Task Force mission, just as the entire mission capability package has been developed to address other pertinent aspects. [1]

The need to educate operational level commanders and staff in the immediate operational environment is critical and must begin spontaneously as soon as the Joint Task Force headquarters element is formed for a specific mission. Consequently, the end state education/learning process must be continual through out the duration of the task

[1] Mission Capability Packages (MCP) would contain concepts of operations, command and force structures, the corresponding doctrine, training and education, technology, and systems with a support infrastructure designed and tailored to accomplish specific missions. An integral part of the MCP concept is the approach proposed to synchronize the insertion of advanced technology with our ability to change the way we fight so that we are able to take advantage of the opportunities afforded by technology. (see endnote viii, pg. 1)

force's mission[ix] as knowledge becomes available about how changes in network centric capabilities are effecting the organization and it's ability to influence the battle space.

Philosophy –

"Basic to this managerial task is creating an organizational culture where change is looked upon as an opportunity rather than a threat, and where the search for new technologies is the focus of attention at all levels in the organization."[x]

The mind state of operational leaders will have to change. Education and training will become a thing that takes place on a daily basis. "Some futurists predict that as the Information Age comes to fruition, workers will spend approximately 20 percent of their time engaged in a new learning process."[xi] It must become commonplace for the future leader to begin his day with technological updates and thinking of new ways or ideas to expand his knowledge of how the organization must operate. We see this every day with children and video games. They play version 1.0 at

9 o'clock in the morning, the child becomes dissatisfied with less than optimal results at 0905 and electronically mails several friends for tips, they access game development websites for new findings and install upgrades. These multi level events occur simultaneously throughout the day. The video game the child plays at 9am is not anything like what he uses at 9pm. However, the goal is always the same – to maximize his ability to utilize the tools available and achieve the highest score possible and win! If children can teach themselves to use new tools and processes instantaneously, we should be able to help the current generation in charge to think and seek information the same way.

Location and deployment –

Conceptually, the education system, to include key players, equipment, and educational tools will be co-located with the Commanders in Chief of the various combatant commands. However, overall coordination would be facilitated at the Joint Chief's of Staff level to provide for the shifting of assets and expertise based on worldwide needs. The intent is to provide an educational network based on virtual collaboration[2]. The emphasis is on rapid development of the correct education/training package to meet the needs of the operational commander and staff and facilitation of a viable web of educators/trainers for the real world mission. The emphasis would be on network centric equipment in organizations. Education teams will deploy in real space or virtually and interconnect as needed with the players typically associated with the development of tactics, techniques, procedures and network centric related items. In a sample organization there is no static link developed between any pieces of the education system or the command for which it was designed. The education network develops and optimizes itself as learning about the needs of the education system develop, after deployment, in the same manner as it will instruct the operational commander to do with his organization.

[2] Virtual collaboration goes far beyond simple sharing of information. It enables elements of the warfighting ecosystem to interact and collaborate in the virtual domain, moving information instead of moving people and achieving a critical knowledge mass. Key component technologies such as video teleconferencing, virtual whiteboards, and collaborative planning applications enable virtual planning. (see endnote xxi, pg. 108)

Major Players -

A major challenge that will be faced is properly staffing a network of educators with the proper background, initiative, and credibility to influence the processes of a joint task force assigned a real world mission. The role of educator is not usually sought after by those up and coming officers who are on the fast track to stardom. It is an even more difficult task to find individuals who can grab the attention of leaders at the operational level and guide them through learning technology and the development of new skills at the speed of light. The opportunity exists to assign high quality officers who are working with industry, battle labs, and acquisition related fields to transition into education teams for the duration of a joint task force mission for a two fold purpose 1) to serve as experts in the most up to date technology and concepts available and 2) to transition from educators to staff members within a CINC staff after a short education team tour of duty is completed. Additionally, it will allow officers to gain first hand experience and interface with key leaders before assuming actual duties within a joint command. This ability to familiarize an officer with an organization should be a potential selling point. It can be further noted that a transitional team of educators should be coupled with a semi-permanent team of experts who can document the metamorphosis of the education process and provide continuity.

We see a large number of great officers retire yearly who clearly have the desire to serve, and possess a wealth of experience. It would be worthwhile to create an additional class of officers eligible for retiree recall under Title 10 U.S.C. section 690[xii] and who would not count under any statutory limit of the number of total retired officers recalled to active duty. This would allow officers retiring within a Combatant command

to stay or transition as an education team member with no gap in actual service. Normal recall periods have been for three years or longer for some members ordered to active duty under the provisions of 10 U.S.C. section 690. Although this would require legislative relief, it is feasible and desirable in order to ensure people with the right background and motivation are available for membership in the education teams. Both assignment policy and statutory changes could be made rather quickly. Obviously, there must also be the ability to contract experts from pertinent technology related fields and institutions of higher learning for specific missions. Added together, this group of active, retired and contract civilians would provide a motivated, experienced, and ever evolving group of educators to aid the operational level commander and staff in getting the most out of network centric warfare technologies and capabilities.

Focus of education –

Since of the educational system is based on a real world mission, and not on a training mission per se, it will be designed to update the operational commanders and staffs on the primary network centric related equipment and tools that are deployed as part of the tailored mission capability package. It is of vital importance in our environment, where there are few standing task forces, to provide the newly formed and tasked commander(s) and staff(s) with the most up to date information. It is readily assumed that, since 1990 technology is doubling at a yearly rate that will continue, the current doctrinal change processes will not catch up, at least in the formal manner to which we have been accustomed to over the last 40-50 years. Therefore, The focus of the education process must be on how to help get the most out of the relevant common

picture (RCP)[3]. The emphasis should be on how best to manage information used by the commanders and staffs. This information will be used to make decisions. Properly managed, that information can also allow others to anticipate the actions of the higher headquarters, thereby spontaneously transmitting commander's intent across the organization and enabling faster response to that intent[xiii]. This involves a new methodology for improving on an organizations implicit coordination capability,[xiv] especially those of the commander and those who can react to the commander's intent. It should be a two way process – teaching the leader to anticipate the needs and actions of the organization, and to teach those in the organization to anticipate the needs and actions of the leaders based on the capabilities of the systems on hand[4].

It is important to train an organization to function when confronted with insufficient information to carry out a task. Van Creveld's third iron rule of command states that a military organization

> "may react by designing the organization, or indeed the task itself, to operate on the basis of less information, relying on the division of the task into various parts and to the establishment of forces capable of dealing with each of the parts separately on a semi-independent basis. It is a central theme . . . through every change . . . [and] technological development that the third one will remain superior . . . in virtually every case."[xv]

---

[3] "The relevant common picture (RCP) of the battlefield is the visual display and underlying database shared throughout the organization. It will allow staffs to maintain a current estimate, and with the help of decision aids, anticipate the future. Commanders and staffs will use it to share the information used to make decisions. It will also allow others to anticipate those decisions, which will quicken coordination, planning and overall organizational response." (see endnote xiii, pg. 3)

[4] " Implicit coordination refers to team members' ability to execute coordinated behavior without having to communicate or discuss it. For example, the no-look or blind pass in basketball is considered an example of implicit coordination. In this case, team members are assessing cues in their environment and predicting what their teammates will do. Likewise, in any combat situation, team members need to accurately predict the information needs of their teammates and provide such information without being asked". (see endnote xiv, pg. 9.)

This suggests that only command by influence systems which distribute uncertainty are likely to be more or less successful[xvi]. So it will be necessary to educate the commander on the primary elements of the command by influence system[5]. The notable theoretical traits to emphasize of a future command by influence model are 1) the mode of command is an image or mental model and not text or voice, 2) the commander's intent can be transmitted as a symbolic representation of the mental image 3) the provision for subtle "directed telescopes" are available to act as the commanders eyes and ears, and 4) there is a reduction in the use of voice and text.[xvii]

Furthermore it would be necessary to teach commanders how to evolve and maximize the efficiency of the organization that is currently available to them[xviii]. It must be realized that the most efficient use of people and systems is probably not how they are arrayed when first deployed. The ability to teach one how to transform a network centric organization into a more efficient organization would be invaluable in the battle command process during operations. Allowing leaders to learn, test and modify the structure becomes part of the mindset that change is wanted, that change is good for the entire organization, and that change is necessary for continued battlefield dominance.

How to educate –

---

[5] "Command-by-influence is the use of *auftragstaktik*, or "mission-type orders," especially as developed by the Germans in the latter stages of World War I and World War II. In this method of command, only the outline and minimum goals of an effort are established in advance, effectively *influencing* all of the forces all of the time. Unlike other command types, great reliance is placed on the initiative of subordinates based on local situational awareness, which translates to lowered decision thresholds. It relies on self-contained, joint, or combined-arms units capable of semi-autonomous action." (see endnote xvii, pg. 4.)

It is very unlikely to think that there is any more available time to grab from an operational commander and then use that small window try to brief him on the newness of the equipment and evolving theories behind the potential it possesses on the battlefield. A major challenge becomes how to teach within the total available time allotted, and make the learning part of the daily routine. "In order to develop decision makers who can respond quickly and who are able to maintain situational awareness while dealing with ambiguity, they need to be exposed to many instances of the task so that appropriate cue pattern-strategy associations can be developed. Since the actual experience of war fighters will vary significantly, relying only on real-world experience will not insure success."[xix] Therefore, the need exists to provide a deployable personal training system that may or may not be integrated into network platforms to enable the operational leader to learn through a process of self designed learning and the creation of personal memory templates. A palm pilot type device that is small and user friendly could be the black box from which the personal training devices evolve. It is feasible to visualize a scenario where the commander can interface with his key players, using the small black box, numerous time a day for potentially just a few seconds at a time and try to solve anticipated problems using new systems and concepts. This system of teaching and implementing recognition primed decision-making[6] with future technology could be managed by the education teams and would facilitate the stated education objectives of

[6] Recognition Primed Decision Making (RPD) - This model describes how experts make decisions under stressful situations, perhaps due to time pressure or rapidly changing environments. The decision maker uses their expertise and experience to quickly assess the situation and to come up with an acceptable course of action. They then "play out" the course of action to see whether it is feasible or requires modification. If the first choice doesn't work, they will go back, select another option, and do the evaluation again. One aspect of RPD is that the expert can quickly rule out unimportant information or unusable solutions, almost on a subconscious level, whereas a novice would need much more time to explicitly think through all possibilities. (see Czerwinski, Tom. Coping with the Bounds: Speculations on Nonlinearity in Military Affairs. May 1998)

improving the implicit learning capabilities of the key players in the organization, understanding the many nuances of command by influence, and maximizing the network centric efficiency of the joint task force organization. The educator's prime role before each iteration is to provide expectations for the personal template development, monitor and provide feedback during template development and then make recommendations for future development of processes, and technology based on what has been learned from the individuals participating in the education process its self.[xx]

It is readily apparent that current and future simulation technology will be necessary to facilitate growth and learning at the organizational level. In addition to a personal training tool, with the focus at problem solving at the individual level, the education system members should be prepared to provide a building block approach to learning through the use of simulations that develop and maximize the potential learning of the entire organization while incorporating the same theories behind learning through recognition primed decision-making that were used at the individual level - namely providing expectations, monitor and providing feedback, and making recommendations to the users. Clearly the role of the education team members would be to link the commanders and staffs with simulation centers, battle labs and centers for lessons learned with portable or web based education team simulation units. This use of simulation to achieve a continuous learning environment through performance of anticipated joint task force mission scenarios would prepare the operational leader and staff to engage in simultaneous planning and decision-making, effectively reducing the amount of uncertainty and chaos when conducting the assigned mission in real time.

Doctrine –

Doctrine must be developed to facilitate the end state education system. However, it's birth and continual development and revision must be modeled according to the same philosophy embedded in the end state education concept. The doctrine must be based on real time knowledge of technology, theory, etc, and must be available to the educator and user as fast as positive change is recognized. There must be an ability to transform embryonic concepts and strategies and develop useable doctrine without the constraints normally imposed by previous institutional considerations[xxi] that included unrealistic developmental timeframes and approval processes that are detrimental to the evolution of network centric educational processes.

Conclusion –

The future network centric battlefield will create a fog of war that cannot be imagined by today's operational leader. It is imperative that commanders are prepared to operate in a world in which technological capacity doubles at a yearly rate. An end state education system must be devised that prepares our senior leaders to operate a newly formed network centric task force with equipment, organizations and theory of use that most likely did not exist in the very recent past. An end state education system that promotes continual learning and fuels the desire to optimize the efficiency of the network centric organization through education is necessary to maintain dominance on the future battlefield. End state educational challenges exist and simply pushing information will further overload the operational commander. However, the right mix of philosophy,

doctrine, educators and personal/organizational training tools will ensure that the operational leader is best prepared to battle command in the 21st century.

Recommendations:

1) Develop an end state education system focused on the operational commander and staff and their needs to understand the network centric organizations, systems, and relevant theories of use for a specific mission.

2) Develop a cadre of educational experts from the pool of recently retired officers with special skills/experience, active duty officers with relevant experience transitioning into the operational command structure, and contract civilian experts to form the basis for educational teams.

2) Focus end state education on mission related network centric technology, development of the implicit learning capabilities of the organizations members, understanding of the relevant common picture, understanding of the traits of the futuristic command by influence system, and how to maximize the efficiency of the network centric organization.

4) Facilitate learning through the teaching and implementing of "recognition primed decision-making" thereby creating an atmosphere that makes learning part of the daily routine using networked personal learning tools, and networked organizational level simulation units.

5) Develop doctrine in a time sensitive framework that operates outside of the normal development process.

BIBLIOGRAPHY

Adams, Thomas K., "The Real Military Revolution," Parameters, (Autumn 2000): 54-65.

Alberts, David S., "Mission Capability Packages," National Defense University Strategic Forum, (January 1995): Article 14

Alberts, David S., Garstka, John J., and Stein, Frederick P., Network Centric Warfare – Developing and Leveraging Information Superiority. CCRP Publication Series, 1999.

Bateman, Robert L., "Avoiding Information Overload," Military Review, (July-August 1998): 1-7

Cannon-Bowers, Jan, "A Strategic Framework for Human Systems Integration in 21st Century Naval Warfare Training Systems," Naval Air Warfare Center Training Systems Division Research. Year 2000.
<http://www.manningaffordability.com/S&tweb/PUBS/StratFrmwkHumSysInt/StratFrmwkHumSysInt.htm#conc> [28 December 2000]

Cebrowski, Arthur K. and Garstka, John H., "Network Centric Warfare—Its Origin and Future," U.S. Naval Institute Proceedings, (January 1998): 28-35.

Clausewitz, Carl. On War. n.p.:Princeton University Press, 1989

Creveld, Martin V., Command in War. n.p.: Brassey's (UK) a member of the Maxwell Macmillan Group, 1991.

Creveld, Martin V., Technology and War from 2000 B.C. to the Present. n.p.: The Free Press, 1985.

Creveld, Martin V., On Future War. Mass: Harvard University Press, 1985.

Creveld, Martin V., The Transformation of War. n.p.: The Free Press, 1991.

Czerwinski, Tom., Coping with the Bounds: Speculations on Nonlinearity in Military Affairs. n.p.:n.p. May 1998.

Czerwinski, Thomas J. "Command and Control at the Crossroads." U.S. Army War College Parameters, (Autumn 1996): 121-132.

De Czege, Huba, Wass, "Optimizing Future Battle Command Technology." Military Review, (March – April): 1998.

Garrett, Stephen F., "Evolving Information Age Battle Staffs" Military Review, (December 1998-February 1998):

Gumbert, Jack, "Leadership in the Digitized Force." Military Review, (January-February 1998):

Hanna, Mark H., "Task Force XXI: The Army's Digital Experiment." National Defense University Strategic Forum, (July 1997): Article 119.

Keithly, David M., and Ferris, Stephen P., "Auftragstaktik, or Directive Control, in Joint and Combined Operations." Parameters, (Autumn 1999): 118-33.

Klein, Gary. "Strategies of Decision Making," Military Review, (May 1989): 64.

Killion, Thomas H., "Decision Making and the Levels of War." Military Review, (November-December 2000):

Libicki, Martin C., and Szafranski, Richard, "Tomorrow's Air Force." National Defense University Strategic Forum, (July 1996): Article 79.

"Navy Distributed Learning Planning Strategy", Memorandum - Subj: NAVY DISTRIBUTED LEARNING PLANNING STRATEGY, 4 Dec 98, <http://www.dlrc.nps.navy.mil/library/navydlplan.html>

Moilanen, Jon H., "Building 21st-Century Leaders," Military Review, (December 1998-February 1999):

Moravec, Hans, "When Will Computer Hardware Match the Human Brain," Journal of Transhumanism. (1 December 1997) < http://www.transhumanist.com/volume1/moravec.htm>, January 10, 2000.

Owens, William. "The Emerging U.S. System-of-Systems," National Defense University Strategic Forum, (February 1996), Article 63.

Park, James, "Evolving Adaptive Organizations." Center for Business Innovation, <http://www.businessinnovation.ey.com/research/newthe/overviewf.html20> January 2001.

Russo, Anthony J., "Leadership in the Information Age." Military Review, (May-June 1999):

Sun Tzu, The Art of War. New York: Oxford University Press, 1963.

Tannebaum, Arnold S., Control in Organizations; McGraw-Hill Book Company, 1968.

Tannebaum, Arnold S., Heirarchy in Organizations, Jossey-Bass Publishers, 1974.

Notes

[i] Clausewitz, Carl von, On War (Princeton University Press, 1989), pg 119

[ii] Klein, Gary. "Strategies of Decision Making," Military Review, May 1989: pg. 64.

[iii] Sun Tzu, The Art of War, translated by Samuel Griffith. (New York: Oxford University Press, 1963), pg 68

[iv] Franklin, Bernard W., "Leadership and Change", Forum, October 1996 Volume 1 Number 1, pg. 1.

[v] Moravec, Hans, "When Will Computer Hardware Match the Human Brain." Journal of Transhumanism. 1 December 1997.< http://www.transhumanist.com/volume1/moravec.htm> January 10, 2000

[vi] Park, James, "Evolving Adaptive Organizations." The Cap Gemini Ernst and Young Center for Business Innovation Complexity and Business Overview. 10 October 2000. <http://www.businessinnovation.ey.com/journal/issue4/features/evolve/body.html> [1 January 2001]

[vii] Cannon-Bowers, Jan, "A Strategic Framework for Human Systems Integration in 21st Century Naval Warfare Training Systems." Naval Air Warfare Center Training Systems Division Research. Year 2000. <http://www.manningaffordability.com/S&tweb/PUBS/StratFrmwkHumSysInt/StratFrmwkHumSysInt.htm#conc> [28 December 2000]: pg.6

[viii] Alberts, David S., "Mission Capability Packages." National Defense University Strategic Forum (January 1995): Article 14, pg. 1.

[ix] Cannon-Bowers, Jan, "A Strategic Framework for Human Systems Integration in 21st Century Naval Warfare Training Systems." Naval Air Warfare Center Training Systems Division Research. Year 2000. <http://www.manningaffordability.com/S&tweb/PUBS/StratFrmwkHumSysInt/StratFrmwkHumSysInt.htm#conc> [28 December 2000]

[x] Price, Walter M., "Technology and Strategic Advantage" California Management Review, (Spring 1996): 38

[xi] Franklin, Bernard W., "Leadership and Change", Forum, October 1996 Volume 1 Number 1, pg. 1.

[xii] General Military Law, U.S. Code, Title 10, sec. 690 (2000)

[xiii] Huba Wass De Czege, "Optimizing Future Battle Command Technology." Military Review, (March – April): 1998, pg. 3.

[xiv] Cannon-Bowers, Jan, "A Strategic Framework for Human Systems Integration in 21st Century Naval Warfare Training Systems." Naval Air Warfare Center Training Systems Division Research. Year 2000. <
<http://www.manningaffordability.com/S&tweb/PUBS/StratFrmwkHumSysInt/StratFrmwkHumSysInt.htm#conc> [28 December 2000] pg. 9

[xv] Creveld, Martin V.,Command in War; Brassey's (UK) a member of the Maxwell Macmillan Group, 1991, pg. 269.

[xvi] Czerwinski, Thomas J. "Command and Control at the Crossroads." U.S. Army War College Parameters, Autumn 1996, pg. 125.

[xvii] ibid.

[xviii] Park, James, "Evolving Adaptive Organizations." The Cap Gemini Ernst and Young Center for Business Innovation Complexity and Business Overview. 10 October 2000. <http://www.businessinnovation.ey.com/journal/issue4/features/evolve/body.html> [1 January 2001]

[xix] Cannon-Bowers, Jan, "A Strategic Framework for Human Systems Integration in 21st Century Naval Warfare Training Systems." Naval Air Warfare Center Training Systems Division Research. Year 2000.
<http://www.manningaffordability.com/S&tweb/PUBS/StratFrmwkHumSysInt/StratFrmwkHumSysInt.htm#conc> [28 December 2000] pg. 6

[xx] Cannon-Bowers, Jan, "A Strategic Framework for Human Systems Integration in 21st Century Naval Warfare Training Systems." Naval Air Warfare Center Training Systems Division Research. Year 2000.
<http://www.manningaffordability.com/S&tweb/PUBS/StratFrmwkHumSysInt/StratFrmwkHumSysInt.htm#conc> [28 December 2000] pg. 9

[xxi] Alberts, David S., Garstka, John J., and Stein, Frederick P., Network Centric Warfare – Developing and Leveraging Information Superiority. n.p.:CCRP Publication Series, 1999.